

CLAIMS:

1. A color electrophoretic display comprising:
pixels each comprising different types of particles (Pf, Pm, Ps; Pa, Pb, Pc)
having different colors and different electrophoretic mobilities, and
a driver (4, 5) for supplying drive voltages to the pixels to operate the color
electrophoretic display either in:
a first mode wherein all the types of particles (Pf, Pm, Ps; Pa, Pb, Pc)
contribute to a change of color of at least some of the pixels, or
a second mode wherein only a subset of the types of particles (Pf, Pm, Ps; Pa,
Pb, Pc) contribute to the change of the color of at least some of the pixels.

10 2. A color electrophoretic display as claimed in claim 1, wherein the pixels each
comprise an image volume (IV) and a reservoir volume (RV), and wherein the different types
of particles (Pf, Pm, Ps; Pa, Pb, Pc) determine a visible color of the pixel (10) when present
in the image volume (IV), and wherein the particles (Pf, Pm, Ps; Pa, Pb, Pc) do not contribute
15 to the visible color of the pixel (10) when present in the reservoir volume (RV).

20 3. A color electrophoretic display as claimed in claim 1, wherein the driver (4, 5)
comprises means (4, 5) for adapting a refresh rate of the electrophoretic display during the
second mode to obtain a display of the video information with a second refresh rate being
higher than the first refresh rate occurring during the first mode.

25 4. A color electrophoretic display as claimed in claim 2, wherein the reservoir
volume (RV) comprises select electrodes (E1, E2) for generating a select electric field (SF) in
the reservoir volume (RV), wherein the image volume (IV) comprises fill electrodes (E3, E4)
for generating a fill electric field (FF) in the image volume (IV), the select electric field (SF)
extending in a first direction (y), the fill electric field (FF) extending in a second direction (x)
not being aligned with the first direction (y), and wherein the particles (Pf, Pm, Ps) are able to
move from the reservoir volume (RV) to the image volume (IV) only locally along a distance
between the select electrodes (E1, E2), the driver (4, 5) being adapted to supply voltage

pulses to the select electrodes (E1, E2) and the fill electrodes (E3, E4) to move the different groups of particles (Pf, Pm, Ps) sequentially into the image volume (IV).

5. A color electrophoretic display as claimed in claim 4, wherein the driver is
adapted for selecting only a single one of the different types of particles (Pf, Pm, Ps) during
the second mode, and to move these particles (Pf, Pm, Ps) into the image volume (IV) in
accordance with a monochrome image to be displayed.

10 6. A color electrophoretic display as claimed in claim 5, wherein the particles
(Pf, Pm, Ps) of the single one of the different types of particles are the particles (Pf) having
the highest mobility.

15 7. A color electrophoretic display as claimed in claim 2, further comprising
select electrodes (SE1, SE2) for generating in the reservoir volume (RV) a
select electric field (SF) for separating the different types of particles (Pa, Pb, Pc) in different
sub-volumes (SVa, SVb, SVc) in the reservoir volume (RV), and
at least one fill electrode (FE1, FE2) for generating a fill electric field (FF) to
move the different types of particles (Pa, Pb, Pc) from the sub-volumes (SVa, SVb, SVc) into
the image volume (IV).

20 8. An electrophoretic display as claimed in claim 7, wherein the at least one fill
electrode (FE1, FE2) is positioned to obtain the fill electric field (FF) directed for
simultaneously moving the different types of particles (Pa, Pb, Pc) from the sub-volumes
(SVa, SVb, SVc) into the image volume (IV).

25 9. An electrophoretic display as claimed in claim 7, wherein the fill electrodes
(FE2) comprise sub fill electrodes (FE2a, FE2b, FE2c) associated with the different sub-
volumes (SVa, SVb, SVc) for generating the fill electric field (FF) to comprise sub fill
electric fields (FFa, FFb, FFc) in the different sub-volumes (SVa, SVb, SVc).

30 10. An electrophoretic display as claimed in claim 7, further comprising:
a further reservoir volume (FRV),
further select electrodes (SEV1, SEV2) for generating in the further reservoir
volume (FRV) a further select electric field (SFV) for separating the different types of

particles (FPa, FPb, FPC) in further different sub-volumes (FSVa, FSVb, FSVC) in the further reservoir volume (FRV), and

5 further fill electrodes (FFE2a, FFE2b, FFE2c) for generating a further fill electric field (FFFa, FFFb, FFFc) to simultaneously or time sequentially move the different types of particles (FPa, FPb, FPC) from the further sub-volumes (FSVa, FSVb, FSVC) into the image volume (IV).

11. An electrophoretic display as claimed in claim 7, wherein the electrophoretic display comprises a controller for controlling the first mentioned select electrodes (SE1, SE2), the at least one first mentioned fill electrode (FE1, FE2), the further select electrodes (SEV1, SEV2), and the further fill electrodes (FFE2a, FFE2b, FFE2c) to obtain a separation of the different types of particles (Pa, Pb, Pc) in the first mentioned reservoir volume (RV) simultaneously to filling or resetting particles (FPa, FPb, FPC) to or from the further reservoir volume (FRV), or the other way around.

15 12. An electrophoretic display as claimed in claim 11, wherein the pixel (10) comprises a further fill electrode (CF) arranged in the image volume (IV) in the second direction further away from the reservoir volume (RV) than the sub fill electrodes (FE2a, FE2b, FE2c) for attracting the particles (Pa, Pb, Pc) leaving the sub-volumes (SVa, SVb, SVc) further into the image volume (IV).

13. An electrophoretic display (1) as claimed in claim 12, wherein the further fill electrode (CF) is positioned with respect to the sub-volumes (SVa, SVb, SVc) to obtain a smallest distance towards the sub-volume (SVa) nearest to a store volume (SV) in the reservoir volume (RV).

14. A method of driving a color electrophoretic display having pixels comprising different types of particles (Pf, Pm, Ps; Pa, Pb, Pc) having different colors and different electrophoretic mobilities, the method comprising supplying (4, 5) drive voltages to the pixels to operate the color electrophoretic display either in:

a first mode wherein all the types of particles (Pf, Pm, Ps; Pa, Pb, Pc) contribute to a change of color of at least some of the pixels, or

a second mode wherein only a subset of the types of particles (Pf, Pm, Ps; Pa, Pb, Pc) contribute to the change of the color of at least some of the pixels.

15. A method as claimed in claim 14, wherein the pixels each comprise an image volume (IV) and a reservoir volume (RV), and wherein the particles (Pf, Pm, Ps; Pa, Pb, Pc) determine a visible color of the pixel (10) when present in the image volume (IV), and
5 wherein the particles (Pf, Pm, Ps; Pa, Pb, Pc) do not contribute to the visible color of the pixel (10) when present in the reservoir volume (RV).
16. A display apparatus comprising a color electrophoretic display as claimed in any one of the claims 1 to 13.